Environmental Science

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This major is interdisciplinary, designed for those with environmental interests and career goals. The program emphasizes experiential learning, commonly through field studies and outdoor education. Courses include real projects and original research participation. Students begin their curriculum with the development of a firm base in the sciences and mathematics. Each student develops an area of specialization by selecting a Concentration from one of two Options. Option I Concentrations lead to a heavier emphasis in science and engineering, and include Environmental Biology, Environmental Geology, Environmental Engineering, Environmental Chemistry, and Climate Science. Option II Concentrations result in a stronger emphasis in the social sciences, humanities, business, and include Environmental Policy & Management, Environmental Law & Protection, Environmental Writing, Green Design, and Environmental Education.

All Environmental Science majors take a pair of capstone courses involving an original research project and a seminar designed to synthesize their education and tie scientific thought to issues in society. The Department houses a number of instruments for environmental monitoring and analysis, and students also have access to resources in their area of Concentration.

Goals:

- To provide an interdisciplinary Liberal Arts degree program in Environmental Science having a strong foundation in the physical and life sciences with a focus on relationships connecting society and nature.
- To provide two options, one with a concentration in the sciences and engineering, and the other with a concentration in the social sciences and humanities.
- To provide instruction and experiences with emphasis on field studies, solution of active problems, and communication in a professional format.

Outcomes:

- Understand the physical laws of nature that control the formation and evolution of Earth materials and biological organisms
- Understand what controls the behavior of the chemical compounds that make up the inorganic and organic materials of the Earth
- Know how to define a problem, design a study to acquire data, critically analyze and interpret data, and discuss the implications of results
- Be able to think critically about published work, synthesize the content of such work, and present findings at a professional level both in writing and orally
- Meet the University's General Education Goals

Careers for this Major:

- Graduate education
- Industry and consulting
- Military
- Environmental agencies
- Non-profit organizations

Environmental Science Major-Option 1 Conc.

B.S. in Environmental Science – Curriculum Map 2018-2019 Catalog

Option I

Print PDF Curriculum Map (http://catalog.norwich.edu/residentialprogramscatalog/collegeofscienceandmathematics/geologyandenvironmentalscience/env_1532371875500.pdf)

Concentrations for Option 1 are: Environmental Biology, Environmental Chemistry, Environmental Geology, Environmental Engineering, or Climate Science.

Course	Cr.	Comp.	Course	Cr.	Comp.
FRESHMAN					
Fall			**Spring**		
BI 101 Principles of Biology I [1]	4		BI 102 Principles of Biology II [1]	4	
EN 101 Composition and Literature I	3		EN 102 Composition and Literature II	3	
GL 110 Introduction to Geology (General Education Lab Science)	4		GL 111 Oceanography (General Education Lab Science)	4	
MA 107 Precalculus Mathematics (General Education Math)	4		MA 108 Applied Calculus (General Education Math) [2]	4	
Fall Semester Total Cr.:	15		Spring Semester Total Cr.:	15	

SOPHOMORE					
Fall			**Spring**		
CH 103 General Chemistry I	4		CH 104 General Chemistry II	4	
Concentration Elective	3-4		Concentration Elective	3-4	
ES 270 Fundamentals of Environmental Science (OR) [3]	4		General Education Literature or ES 130 (http://catalog.norwich.edu/archives/2018-19/residentialprogramscatalog/generaleducationgoals)	3	
Free Elective (3 cr.)			MA 232 Elementary Statistics	3	
ES 251 Sophomore Seminar in Environmental Science	1		Free Elective [3]	3-4	
PH 323 Environmental Ethics (General Education Ethics OR)	3				
General Education Arts & Humanities (http://catalog.norwich.edu/archives/2018-19/residentialprogramscatalog/generaleducationgoals)					
Fall Semester Total Cr.:	15-16		Spring Semester Total Cr.:	16-18	
JUNIOR					
Fall			**Spring**		
Concentration Elective	3-4		ES 130 Introduction to Environmental Law (OR General Education Literature)	3	
EC 201 Principles of Economics (Macro) (General Education Social Science) or 202 Principles of Economics (Micro)	3		Concentration Elective	3-4	
PS 201 General Physics I	4		ES 340 Project Development in Environmental Science	1	
General Education Arts & Humanities or PH 323) (http://catalog.norwich.edu/archives/2018-19/residentialprogramscatalog/generaleducationgoals)	3		PS 202 General Physics II	4	
Free Elective (or ES 270) [3]	3-4		Free Elective [3]	4-3	
Fall Semester Total Cr.:	16-18		Spring Semester Total Cr.:	15	
SENIOR					
Fall			**Spring**		
BI 205 Ecology	4		Concentration Elective	3-4	
Concentration Elective	3-4		ES 451 Environmental Science Seminar	3	
ES 440 Research Project in Environmental Science (Capstone)	3		ES 460 Project Completion in Environmental Science	1	
GL 255 Hydrogeology	3		General Education History (http://catalog.norwich.edu/archives/2018-19/residentialprogramscatalog/generaleducationgoals)	3	
General Education Leadership (http://catalog.norwich.edu/archives/2018-19/residentialprogramscatalog/generaleducationgoals)	1-3		Free Elective [3]	4-3	
Fall Semester Total Cr.:	14-17		Spring Semester Total Cr.:	14	
TOTAL CREDITS FOR THIS MAJOR: 120-128					

1 EnvCH and EnvEG concentrations students take CH 103 and CH 104 as freshmen, and BI 101 and BI 102 in the second year.

2 Or equivalent, especially if needed as a prerequisite for Concentration courses.

3 Can be used out of sequence and to take more than one concentration elective concurrently.

Available Concentrations – Option I

Environmental Biology Concentration 2018-2019 Catalog

GL 261	Field Geology	4
CH 205	Survey of Organic Chemistry	4
BI 220	Introductory Microbiology	4
BI 326	Natural History of the Vertebrates	4
Two of the following:		8
BI 316	Plant Taxonomy	4

BI 351	Dendrology and Silvics	4
BI 424	Woodland Ecology and Management	4
Total Cr.		24

Environmental Geology Concentration 2018-2019 Concentration

GL 253	Geomorphology	4
GL 257	Sedimentology	4
GL 261	Field Geology	4
GL 263	Mineralogy	4
GL 200 level Elective or EG 203 Materials Science		3-4
CH elective: CH204 or above, 3-4 cr. options only		3-4
Total Cr.		22-24

Environmental Chemistry Concentration 2018-2019 Catalog

CH 204	Quantitative Analysis	4
CH 205	Survey of Organic Chemistry	4
GL 263	Mineralogy	4
Three of the following:		10-12
GL 261	Field Geology	4
CH 314	Instrumental Methods (+/- CH 315 Lab)	3/4
EG 203	Materials Science	3
BI 220	Introductory Microbiology	4
Total Cr.		22-24

Environmental Engineering Concentration 2018-2019 Catalog

EG 109	Introduction to Engineering I	3
CE 211	Surveying	3
EG 203	Materials Science	3
AP 221	Site Development and Design	3
GL 253	Geomorphology	4
One of the following:		3-4
GL 261	Field Geology	4
MA 241	Mathematical Computation and Modeling	3
CH elective: CH 204 or above, 3-4 cr. options only		3-4
Total Cr.		19-20

Climate Science Concentration 2018-2019 Catalog

GL 265	Glacial Geology and Paleoclimate	4
CH 204	Quantitative Analysis	4
GL 253	Geomorphology	4
MA 241	Mathematical Computation and Modeling	3
Two of the following:		6-8
CH 314	Instrumental Methods (+/- CH 315 Lab)	3/4
PO 305	Geopolitics (recommended)	3
BI 395	Evolution	4
PO 415	International Law	3
Total Cr.		21-23

Environmental Science Major-Option 2 Conc.

B. S. in Environmental Science – Curriculum Map 2018-2019 Catalog

Option II

Print PDF Curriculum Map (http://catalog.norwich.edu/residentialprogramscatalog/collegeofscienceandmathematics/geologyandenvironmentalscience/env2_1532372015581.pdf)

Concentrations for Option 2 are: Environmental Policy and Management, Environmental Law and Protection, Environmental Writing, Green Design, or Education

Course	Cr.	Comp.	Course	Cr.	Comp.
FRESHMAN					
Fall			**Spring**		
BI 101 Principles of Biology I	4		BI 102 Principles of Biology II	4	
EN 101 Composition and Literature I	3		EN 102 Composition and Literature II	3	
GL 110 Introduction to Geology (General Education Lab Science)	4		GL 111 Oceanography (General Education Lab Science)	4	

MA 107 Precalculus Mathematics (General Education Math)	4		MA 108 Applied Calculus (General Education Math)	4	
Fall Semester Total Cr.:	15		Spring Semester Total Cr.:	15	
SOPHOMORE					
Fall			**Spring**		
Concentration Elective	3-4		Concentration Elective	3-4	
ES 270 Fundamentals of Environmental Science or EC 201 Principles of Economics (Macro) or EC 202 Principles of Economics (Micro)	4-3		MA 232 Elementary Statistics	3	
ES 251 Sophomore Seminar in Environmental Science	1		PY 211 Introduction to Psychology (General Education Social Science)	3	
PH 323 Environmental Ethics (General Education Ethics and General Education Arts & Humanities) or EN 276 Environmental Writing	3		General Education Literature or ES 130 (http://catalog.norwich.edu/archives/2018-19/residentialprogramscatalog/generaleducationgoals)	3	
PO Elective [1]	3		PO Elective 2 [1]	3	
Fall Semester Total Cr.:	14		Spring Semester Total Cr.:	15-16	
JUNIOR					
Fall			**Spring**		
CH Chemistry Elective	4		Concentration Elective	3	
Concentration Elective	3-4		ES 130 Introduction to Environmental Law (or General Education Literature)	3	
EC 201 Principles of Economics (Macro) or 202 Principles of Economics (Micro) or ES 270 Fundamentals of Environmental Science	3-4		ES 340 Project Development in Environmental Science	1	
EN 276 Environmental Writing or PH 323 Environmental Ethics	3		GL 253 Geomorphology (or Free Elective) [2]	4	
SO 201 Introduction to Sociology (General Education Social Science)	3		General Education History (http://catalog.norwich.edu/archives/2018-19/residentialprogramscatalog/generaleducationgoals)	3	
			Free Elective [2]	3-4	
Fall Semester Total Cr.:	16-18		Spring Semester Total Cr.:	17-18	
SENIOR					
Fall			**Spring**		
BI 205 Ecology	4		ES 451 Environmental Science Seminar	3	
Concentration Elective	3-4		ES 460 Project Completion in Environmental Science	1	
ES 440 Research Project in Environmental Science (Capstone)	3		Concentration Elective	3-4	
General Education Arts & Humanities OR PH 323 (http://catalog.norwich.edu/archives/2018-19/residentialprogramscatalog/generaleducationgoals)	3		Free Elective [2]	3-4	
General Education Leadership (http://catalog.norwich.edu/archives/2018-19/residentialprogramscatalog/generaleducationgoals)	1-3		Free Elective (or GL 253) [2]	3-4	
			Free Elective [2]	3-4	
Fall Semester Total Cr.:	14-17		Spring Semester Total Cr.:	16-20	
TOTAL CREDITS FOR THIS MAJOR: 122-133					

1 Selected from PO 105 American Politics, PO 215 International Relations and PO 305 Geopolitics; Green Design concentration students take EG 109 Introduction to Engineering I and EG 110 Introduction to Engineering II.

2 Can be used out of sequence and to take more than on concentration elective concurrently.

Available Concentrations – Option II

Environmental Policy and Management Concentration 2018-2019 Catalog

MG 101	Introduction to Business	3
CS 120	Business Applications & Problem Solving Techniques	3

SO 202	Problems of Modern Society	3
PO 321	U.S. Constitutional Law	3
MG 309	Management of Organizations	3
MG 341	Business Law I	3
Total Cr.		18

Environmental Law and Protection Concentration 2018-2019 Catalog

CJ 101	Introduction to Criminal Justice	3
CJ 102	Substantive Criminal Law	3
CJ 402	Law and Society	3
Two of the following three:		6
PO 321	U.S. Constitutional Law	3
PO 314	The Legislative Process	3
PO 331	State and Local Politics	3
SO 202	Problems of Modern Society	3
Total Cr.		18

Environmental Writing Concentration 2018-2019 Catalog

EN 274	Introduction to Creative Writing	3
EN 364	Intermediate Creative Writing	3
Four of the following:		12
EN 203	Advanced Composition	3
EN 227	Survey of American Literature I	3
EN 228	Survey of American Literature II	3
EN 251	Literature of the Sea	3
EN 282	Literary Methods	3
EN 292	American Ethnic Literature & Cultural Literature	3
EN 320	Literature of the Developing World	3
CM 109	Introduction to Mass Media	3
Total Cr.		18

Green Design Concentration 2018-2019 Catalog

AP 111	Fundamentals of Architecture	4
AP 118	Fundamentals of Architecture II	4
AP 221	Site Development and Design	3
AP 225	Introduction to Passive Environmental Systems	3
AP 325	Materials, Construction, and Design	3
One of the following three:		3
FA 201	History/Theory of Architecture I	3
FA 202	History/Theory of Architecture II	3
FA 308	History/Theory of Artchitectural III	3
Total Cr.		20

Environmental Education Concentration 2018-2019 Catalog[1]

ED 104	Foundations of Education	3
Five of the following:		16-19
ED 234	Learning and Teaching Strategies	4
ED 315	Special Needs Child	3
ED 351	Methods of Teaching Science to Elementary Students	3
ED 363	Reading and Writing in the Content Area	4
PY 220	Developmental Psychology	3
PY 324	Adolescent Psychology	3
PY 352	Learning and Memory	4
Total Cr.		19-22

1 For Environmental Education concentration students seeking licensure, a double major in Education, Elementary Teacher Licensure is required, and may require an additional semester for student teaching.